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Deployment of AVEVA™ Predictive Analytics in energy from waste

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AVEVA

DEPLOYMENT OF AVEVA™ PREDICTIVE ANALYTICS IN ENERGY FROM WASTE

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October 2023



Summary

1. Introduction

- SUEZ recycling and recovery UK

2. The Process

- How energy recovery works

3. Challenges

- What are the challenges?
- What are the consequences when we get it wrong?

4. Predictive Monitoring

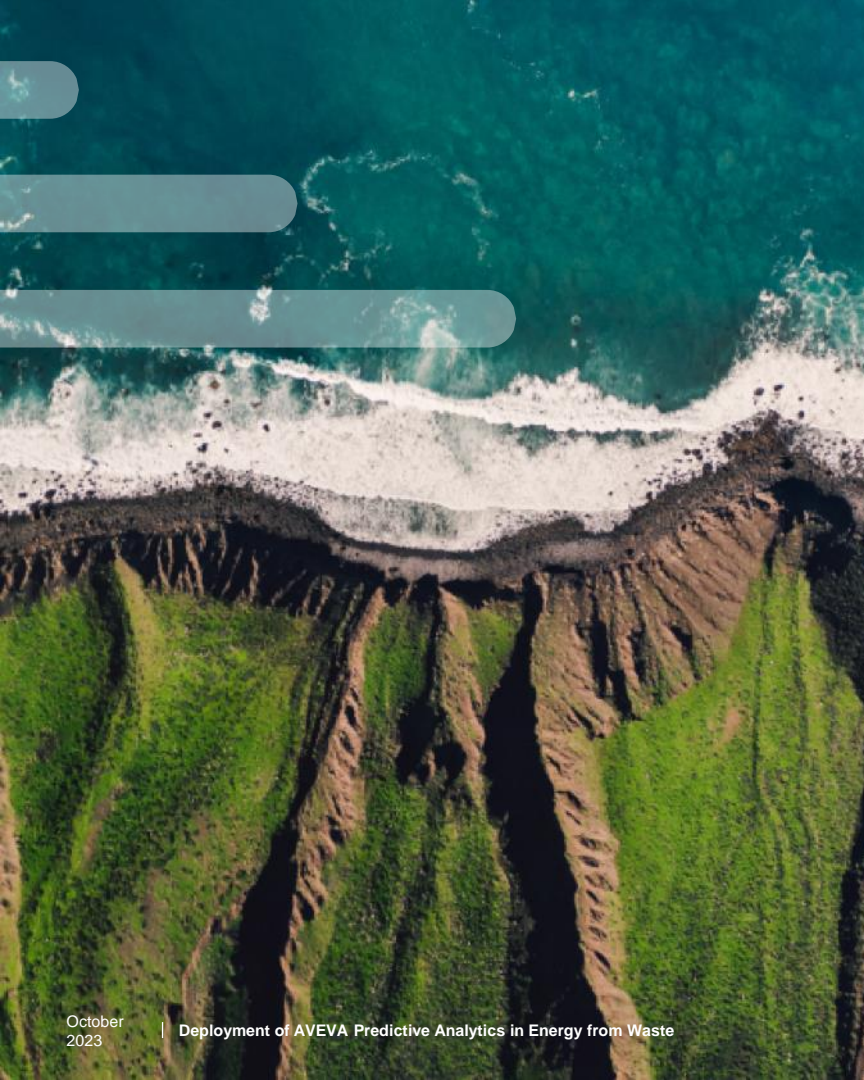
- Why AVEVA Predictive Analytics?
- Predictive Analytics Trial
- Next Steps



1

Introduction





SUEZ recycling and recovery UK

ABOUT US

- ⇒ Part of the **SUEZ GROUP**
- ⇒ **+5,000** employees
- ⇒ Since **1988**
- ⇒ Manage **WASTE** and **WATER**
- ⇒ Generate **HEAT** and **POWER**
- ⇒ Manufacture **ALTERNATIVE** Fuels
- ⇒ Process **RECLAIMED WOOD**
- ⇒ **RECYCLE** a wide range of materials
- ⇒ Our **VISION:** To live in a world where there is **NO MORE WASTE**



SUEZ recycling and recovery UK

ENERGY FROM WASTE

- ⇒ **11** UK Energy from Waste Plants
- ⇒ Turn **WASTE** into local source of **RENEWABLE ENERGY**
- ⇒ Plant waste processing capabilities range from **55kT** to **500kT** per annum
- ⇒ SUEZ **TOTAL** EfW generating capacity is **233 MW**
- ⇒ Circa **2.5MT** of household & commercial waste processed per annum
- ⇒ **>1.4 MILLION MWh** electricity generated every year

SUEZ recycling and recovery UK

ENERGY FROM WASTE

- ⇒ We are a **WASTE MANAGEMENT COMPANY** - not a Power Generation Company!
- ⇒ Electrical generation capability ranging from **4MW** to **50MW**
- ⇒ An average EfW site is similar in size to a traditional power station
- ⇒ **OPERATE & MAINTAIN**



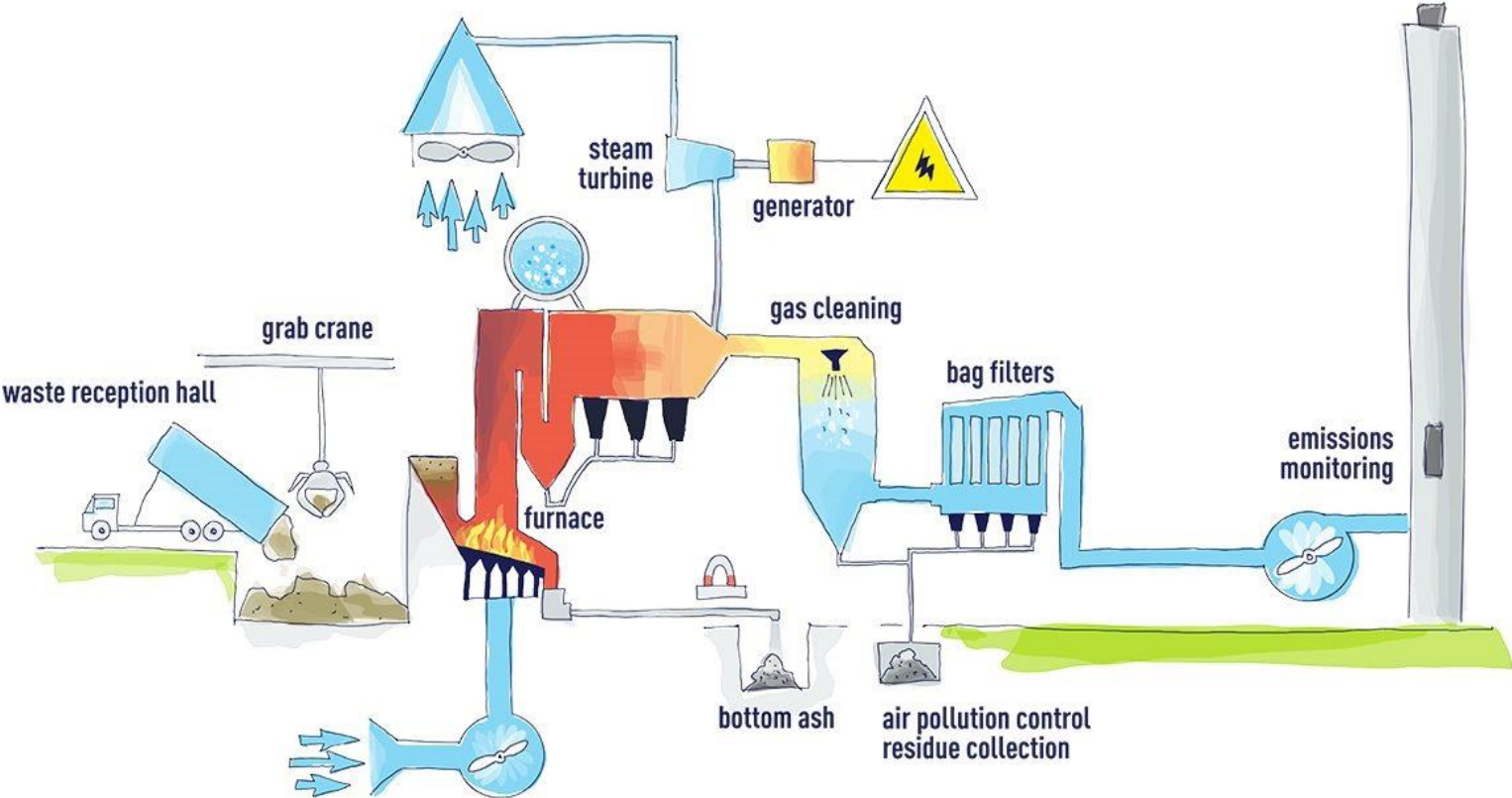
Suffolk Energy from Waste Plant

2

The Process



How energy recovery works



3

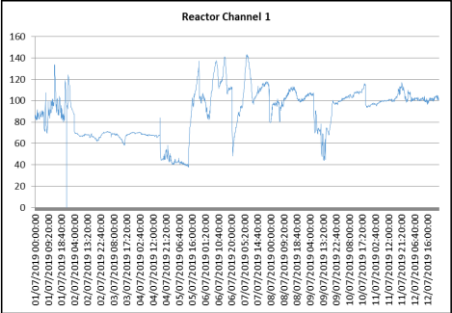
Challenges



Challenges



Asset Performance



Process Deviations



Planned Maintenance

Challenges

**Environmental
impacts**

**Financial impact of
no (or reduced)
power generation**

**Increased
chances of boiler
tube leaks**

**What happens when
we get it wrong?**

**Financial impact
of redirecting
waste**

**Offline for >5
days**

4

Predictive Monitoring





Predictive Monitoring

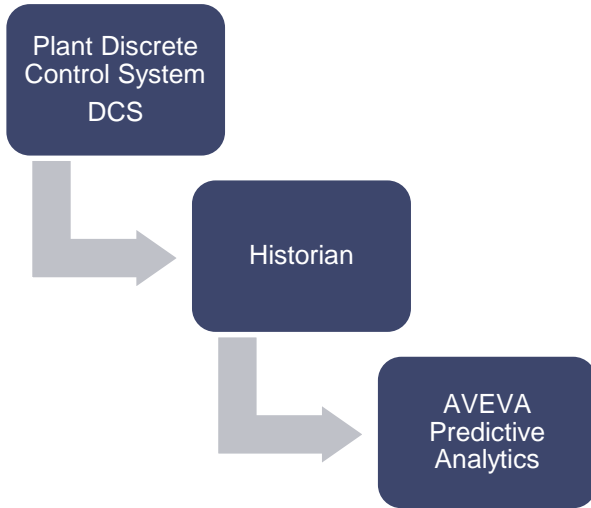
WHY AVEVA PREDICTIVE ANALYTICS?

- ⇒ A **SINGLE** Technical Plant Engineer per plant
- ⇒ Difficulty assessing plant performance
- ⇒ **ONE** planned maintenance period per year

- ⇒ We wanted a platform that would:
 - Allow performance of processes and assets to be assessed in **VARIABLE CONDITIONS**.
 - **EARLY IDENTIFICATION** of issues

Predictive Analytics Trial

⇒ SET-UP



- AVEVA software installed within the SUEZ Data Centre
- The software receives all plant data from historian.

⇒ TRIAL

- Software trialled over 5 months at Wilton EfW Plant
- Trial included:
 - Creation of 17 models, covering 7 assets
 - Co-monitoring of models
 - 3 day onsite training course
- Challenges
 - ‘Digital models can only be as good as the instrumentation fitted on plant. Insufficient measurements can lead to poor (or a lack of) models.
- Benefits
 - Models were relatively quick to build, circa 40 minutes.
 - Models detected multiple instrumentation issues.
 - Successful detection of a combustion air fan bearing failure

Predictive Analytics Trial – Fan Model



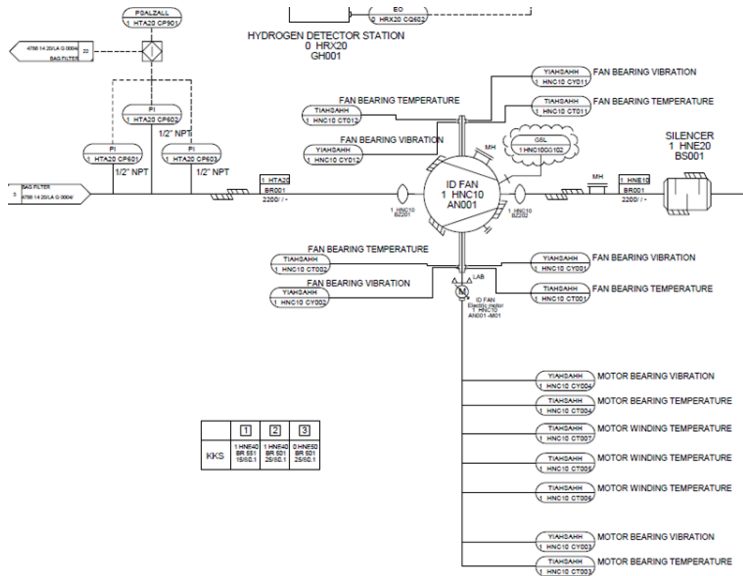
Typical Induced Draft Air Fan



Failed Bearing

Predictive Analytics Trial – Fan Model

TAG MAPPING



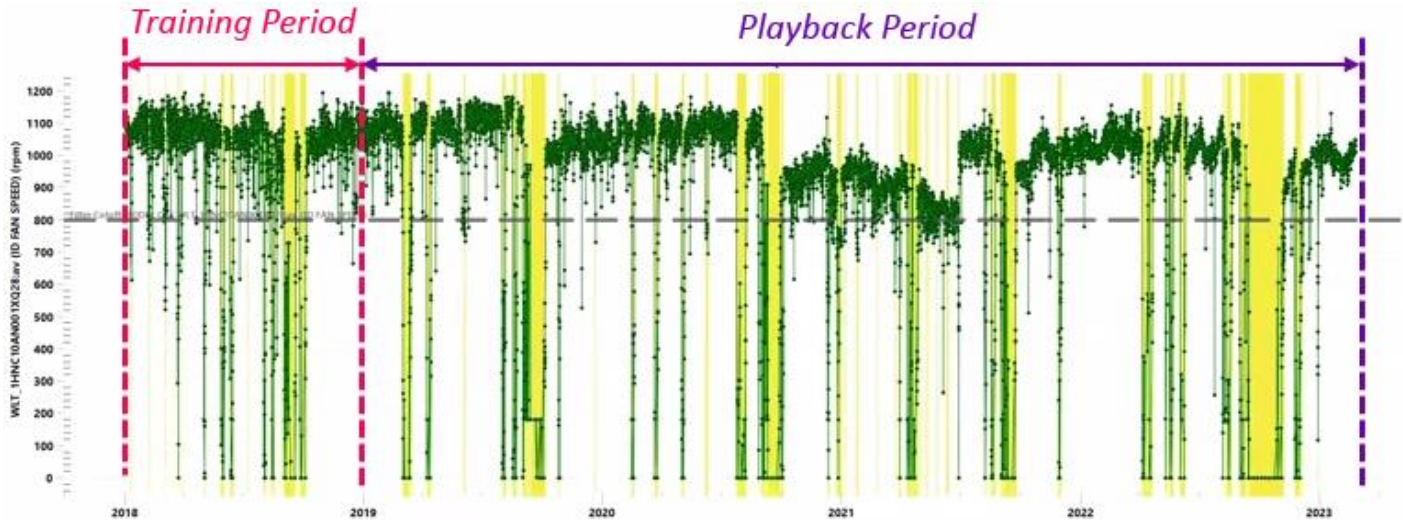
Metric	Line 1	Line 2	Model Group
MOTOR SPEED	WLT_1HNC10AN001XQ28.av	WLT_2HNC10AN001XQ28.av	Multiple
MOTOR CURRENT	WLT_1HNC10AN001XQ15.av	WLT_2HNC10AN001XQ15.av	Multiple
MOTOR ACTIVE POWER	WLT_1HNC10AN001XQ21.av	WLT_2HNC10AN001XQ21.av	Multiple
MOTOR TORQUE	WLT_1HNC10AN001XQ30.av	WLT_2HNC10AN001XQ30.av	Multiple
FAN SPEED SETPOINT PV	WLT_1HNC10AN001YQ01.me	WLT_2HNC10AN001YQ01.me	Multiple
FAN SPEED SETPOINT SPA	WLT_1HNC10AN001YQ01.spa	WLT_2HNC10AN001YQ01.spa	Multiple
DE BRG TEMPERATURE 1	WLT_1HNC10CT001XQ02.av	WLT_2HNC10CT001XQ02.av	Fan Mechanical
DE BRG TEMPERATURE 2	WLT_1HNC10CT002XQ02.av	WLT_2HNC10CT002XQ02.av	Fan Mechanical
DE BRG VIBRATION X	WLT_1HNC10CY001XQ02.av	WLT_2HNC10CY001XQ02.av	Fan Mechanical
DE BRG VIBRATION Y	WLT_1HNC10CY002XQ02.av	WLT_2HNC10CY002XQ02.av	Fan Mechanical
NDE BRG TEMPERATURE 1	WLT_1HNC10CT011XQ02.av	WLT_2HNC10CT011XQ02.av	Fan Mechanical
NDE BRG TEMPERATURE 2	WLT_1HNC10CT012XQ02.av	WLT_2HNC10CT012XQ02.av	Fan Mechanical
NDE BRG VIBRATION X	WLT_1HNC10CY011XQ02.av	WLT_2HNC10CY011XQ02.av	Fan Mechanical
NDE BRG VIBRATION Y	WLT_1HNC10CY012XQ02.av	WLT_2HNC10CY012XQ02.av	Fan Mechanical
MOTOR BRG TEMP 1 NDE	WLT_1HNC10CT004XQ02.av	WLT_2HNC10CT004XQ02.av	Motor Mechanical
MOTOR BRG TEMP 1 DE	WLT_1HNC10CT003XQ02.av	WLT_2HNC10CT003XQ02.av	Motor Mechanical
MOTOR BRG VIB X NDE	WLT_1HNC10CY004XQ02.av	WLT_2HNC10CY004XQ02.av	Motor Mechanical
MOTOR BRG VIB X DE	WLT_1HNC10CY003XQ02.av	WLT_2HNC10CY003XQ02.av	Motor Mechanical
MOTOR WINDNG TEMP U	WLT_1HNC10CT005XQ02.av	WLT_2HNC10CT005XQ02.av	Motor Thermal
MOTOR WINDNG TEMP V	WLT_1HNC10CT006XQ02.av	WLT_2HNC10CT006XQ02.av	Motor Thermal
MOTOR WINDNG TEMP W	WLT_1HNC10CT007XQ02.av	WLT_2HNC10CT007XQ02.av	Motor Thermal
FAN FLOW	WLT_1HN40CP001XQ01.av	WLT_2HN40CP001XQ01.av	Fan Process
FAN SUCTION TEMP	WLT_1HTA20CT001XQ02.av	WLT_2HTA20CT001XQ02.av	Fan Process
FAN DISCHARGE TEMP	WLT_1HN40CT001XQ01.av	WLT_2HN40CT001XQ01.av	Fan Process
FAN DISCHARGE PRESS	WLT_1HN40CP001XQ01.av	WLT_2HN40CP001XQ01.av	Fan Process
FAN SUCTION PRESSURE	WLT_1HTA20CP901XQ99.av	WLT_2HTA20CP901XQ99.av	Fan Process

- The tags are mapped in four groups to AVEVA's standard model templates:

- Motor Mechanical
- Motor Thermal
- Fan Mechanical
- Fan Process

Predictive Analytics Trial – Fan Model

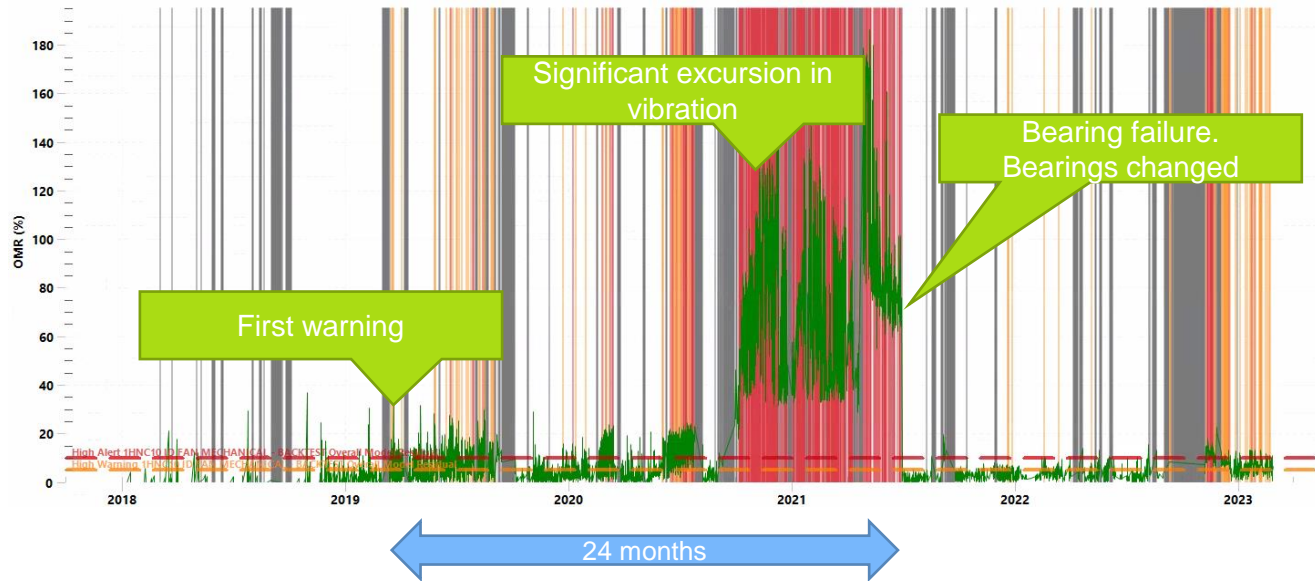
MODEL TRAINING DATA



- Data extracted from plant historian system back to 2018
- A years worth of data selected as baseline training data
- A filter (yellow shaded data left) is used to deactivate the models when the motor speed is less than 800 RPM
- Data is cleaned before it is used for training to remove any outliers.

Predictive Analytics Trial – Fan Model

LINE 1 FAN MECHANICAL MODEL

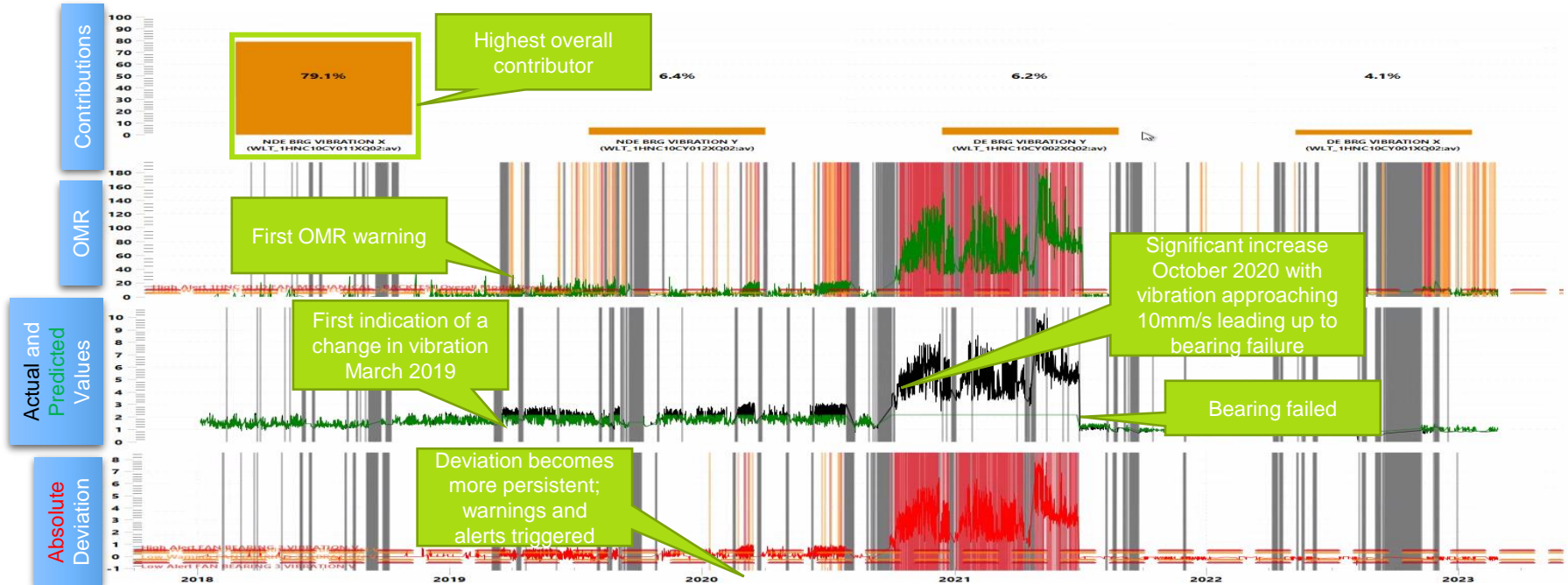


⇒ WILTON LINE 1 INDUCED DRAUGHT FAN FAILURE

- In Dec 2020, high vibration was detected
- Failure occurred two weeks before the planned outage.
- The model was able to detect the first instances of bearing deterioration in May 2019.
- Earlier detection would have prevented **5** days unplanned downtime.

Predictive Analytics Trial – Fan Model

LINE 1 FAN ANALYSIS



Predictive Monitoring – AVEVA

⇒ CURRENT SITUATION

- Models have been created & deployed on Wilton EfW
- A team of engineers have completed a 3 day training course covering model building and monitoring

Models created for:

- Boiler flue gas path
- Boiler tube leaks
- Steam turbine - mechanical & efficiency
- Generator - mechanical, thermal & electrical
- Air cooled condenser efficiency
- Water tube condenser efficiency
- Combustion air fans - mechanical, process & thermal

⇒ NEXT STEPS

- AVEVA to create **400** models for **10** EfW plants in **6** months
- All Site Technical Plant Engineers to be trained in building and monitoring models.
- AVEVA monitoring to be used as a basis for weekly plant performance meetings, and quarterly performance review analysis.

THANK YOU



Questions?

Please wait for the microphone.
State your name and company.



Please remember to...

Navigate to this session in the mobile app to complete the survey.



Thank you!

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